004811

OCT - 5 1981

A GEOGRAPHICAL ANALYSIS OF COMMUNITY SERVICE UTILIZATION IN THE CITY OF HAMILTON

PART II

by

Mike Pennock, Research Director
Peter Steckenreiter, Planning Associate
Devianee Caussy, Research Assistant

URBAN DOCUMENTATION CENTRE
RESEARCH UNIT FOR URBAN STUDIES
McMASTER UNIVERSITY
HAMILTON, ONTARIO

January, 1981

THE SOCIAL PLANNING and RESEARCH COUNCIL of Hamilton and District

153½ KING STREET EAST HAMILTON, ONTARIO TELEPHONE 522-1148

FUNDING FOR THIS PROJECT WAS PROVIDED BY THE

WELFARE GRANTS DIRECTORATE,
HEALTH AND WELFARE CANADA

CONCLUSIONS AND FINDINGS OF THIS PROJECT
ARE NOT THOSE OF HEALTH AND WELFARE CANADA

URBAN DOCUMENTATION CENTRE
RESEARCH UNIT
McMASTER UNIVERSITY
HAMILTON

004811

TABLE OF CONTENTS

		Page
CHAPTER I	- INTRODUCTION	1
	Social Indicators	4
	Model Construction	6
CHAPTER II	- METHODOLOGY	8
	Setting	8
	Socio-Economic Indicators	8
	Agency Utilization Rates	10
	Analysis	10
CHAPTER III	- RESULTS: FACTOR ANALYSIS	13
	Family Analysis	13
	Housing	16
	Economic/Employment	18
	Summary	20
CHAPTER IV	- RESULTS: REGRESSION ANALYSIS	21
	Comparison of Methods	21
	The Individual Indicator Approach	23
	Summary	29
CHAPTER V	- RESULTS: CAUSAL ANALYSIS	30
	Child Welfare Services	32
	Meals-on-Wheels	36
	Police Calls	38
	Family Services	43
	Conclusion	45
CHAPTER VI	- DISCUSSION	46

INDEX OF TABLES

		Page
Table I:	Definitions of Census Indicators	9,9a
Table II:	Service Descriptions	12,12a
Table III:	Family Factors	15
Table IV:	Housing Factors	17
Table V:	Economic Factors	19
Table VI:	R^2 Values for Two Methods	22
Table VII:	Incremental R^2 Values for Family Indicators .	24
Table VIII:	Incremental R^2 Values for Housing Indicators .	26
Table IX:	Incremental R^2 Values for Economic/Employment Indicators	28
Table X:	Decomposition of Child Welfare Co-variance . .	33
Table XI:	Catholic Children's Aid Society Model.	34
Table XII:	Children's Aid Society Model	35
Table XIII:	Meals-on-Wheels	37
Table XIV:	Decomposition of Police Calls	39
Table XV:	Police Calls, Crimes Against Property	40
Table XVI:	Police Calls, Disturbances	41
Table XVII:	Police Calls, Crimes Against Persons	42
Table XVIII:	Family Services	44

CHAPTER I

INTRODUCTION

The purpose of this study was to test the efficacy of socio-economic indicators in the prediction of community service utilization. More specifically, it was designed to provide an initial answer to the question - How do the socio-economic characteristics of an area effect the utilization of different kinds of community services in that area? Are some socio-economic characteristics related to utilization of some community services and not others? Are different social services associated with different demand characteristics? The question can be phrased in any number of ways, although the task remains constant - the development of socio-economic models to account for varying rates of social service utilization across small geographical units.

As a result of the idiosyncratic nature of most social service systems, it is necessary to examine this question on the geographical basis of individual communities. With the exception of some provincially funded services, all geographical areas do not have the same social service agencies. If, for example, one wanted to examine the utilization of family service agencies at the geographical level of counties in Ontario, the analysis would be severely hampered by the fact that a number of counties do not contain independent family service agencies. In addition, within the counties that do have family service agencies, utilization will be effected by such non socio-economic variables as funding policies, intake policies and basic administrative practices.

As a result of concerns such as this, the present analysis was confined to a particular geographical community - the Regional Municipality of Hamilton-Wentworth.

The greatest source of the kind of socio-economic information required for this analysis is the national census which is conducted every five years by Statistics Canada. The main advantages of this data base are two-fold - the large quantity of indicators which are

available and the fact that the indicators are available on the basis of geographical units as small as a few city blocks. Hamilton-Wentworth, for example, is divided into ninety-six "census tracts" which, in turn, are subdivided into a large number of "enumeration areas".

To examine the utilization of social services across Hamilton-Wentworth, it is obviously necessary to divide the municipality into a number of smaller geographical areas so that one area may be compared with another. The availability of census data at the level of census tracts and enumeration areas makes it possible to utilize the necessary socio-economic indicators.

The use of census indicators as predictive variables has a substantial history in the literature. In one of the earliest studies on this subject, Gruenberg (1954) identified the characteristics of census tracts associated with high rates of cerebral arterioslerosis and senile psychosis. Bodian et al (1963) performed a similar analysis related to schizophrena. In two studies, Bloom (1966, 1968) utilized census tract based cluster scores to examine inpatient utilization and the ecological correlates of various social problems.

The efforts have been further refined, in the mental health area, by Pollach (1965), Redick and Goldsmith (1972), and Rosen, 1974).

In a somewhat different vein, Trute and Segal (1976) utilized census indicators to study the question, "Could different communities, with different social-environmental attributes, support differing levels of social integration in the respective populations or residents who were living in psychiatric sheltered care facilities?" (pg. 154).

In a further refinement of this methodology, Dear (1976) analyzed the geographical location of clientele from twelve mental health facilities in the Hamilton area. The relative effects of distance and socio-economic factors were compared using multiple regression analysis.

There has, however, been relatively little work done in the application of these methods to the study of social service utilization. Coughlin, Bieri and Plant (1976) analyzed the location pattern of 1,577 social service facilities in Philadelphia, although they did not study the dispersion of clientele. They concluded that the incidence of facilities could be explained by several socio-economic variables.

Using 1971 census data for the City of Hamilton, Pennock et al (1978) concluded that multiple regression equations could account for a significant amount of variance in the utilization rates of various social services. The independent variables in this study were census-based socio-economic indicators.

Underlying all of these methods, which have been collectively labelled as the "ecological approach" (Jackson, Borgatta and Goldsmith, 1980) are fundamental elements of model building. The implicit purpose of all these studies involves the construction of models relating community indicators to some aspect of pathology or service demand. In examining these approaches, it is important to examine both the nature of the data as the inputs to the system as well as the type of methodology used to build the actual model.

The first question, related to the nature of the data, is pertinent to the field of social indicators. During the past ten years, there has been a rapid expansion in interest in this field, as a social counterpart to the more familiar economic indicators. In addition to the actual compilation of indicators (i.e. Statistics Canada, 1977), a number of more theoretical works have been published (Fox, 1974; Maslove, 1975).

With the advantage of regular, standardized and comprehensive data gathering methods, the national census has become a major source of social indicators.

SOCIAL INDICATORS

The rapid growth in the utilization of social indicators has not been without its critics. Much of this criticism has not so much dealt with the use of indicators but, rather, with their misuse. Social indicators are measurement devices and, as such, should be subjected to the same rigorous criteria as are other socio-psychological instruments of measurement.

In the field of psychometrics, for example, the concept of "validity" is of major importance. In its standard form, "validity" has been defined as..."1) the extent to which the test measures the hypothesized underlying trait, construct or factor or 2) the relationship between test scores and some extra-test criterion measure." (Browne, 1970, pg. 117). Basically, then, validity refers to the question - Is the social indicator, in fact, measuring what we think it is measuring?.

An example of the importance of validity in application to social indicators is found in the critique by Francis (1973) of a paper published by Spautz (1972). The latter author had utilized "social welfare expenditures" (the U.S. Health Education and Welfare budget) as an indicator of "human welfare". The criticism by Francis was as follows:

> "Is the increasing size of social welfare expenditures (the HEW budget) a measure of welfare....., of increasing problems, of Parkinsons Law or of anything important at all?" (pg. 80)

Given a sufficiently broad definition of the concept "social welfare", there are a multitude of possible indicators of which "government expenditures" are only one.

To return to the analogy of psychometrics, this is similar to the problem faced by the author of a psychological test who has a large

number of potential items to measure a trait and wishes to reduce that number to a more practical few items. The statistical solution which is often used in this case is that of factor analysis which serves to interrelate all of the items and form clusters or "factors" of similar items (Browne, 1970). On each factor, each item has a numerical "loading" which identifies the strength of the relationship between that item and the dimension underlying the factor. Given the identification of this underlying factor as a trait to be measured, the items with the highest loadings are then chosen as "measurements" of that trait.

The use of factor analysis with social indicators is, therefore, a useful method of reducing a large number of indicators to a smaller number of clusters or factors. This methodology appears with some frequency in the social indicators literature.

It has been used to study social trends across time (Cattel and Adelson, 1951) as well as across space. The latter, spatial analysis, is, of course, relevant to the present study. Bloom (1966) subjected forty-two variables from the thirty-four census tracts of an American community to factor analysis and the resulting factors were then correlated with indices of the frequency of admission to mental institutions. Anderson (1972) performed a factor analysis of mortality rates for New Mexico counties and Pennock (1975) carried out a similar analysis of Ontario counties.

In a review of these procedures, Jackson, Borgatta and Goldsmith (1980) compared different methods for identifying "clusters" of individual indicators - common factor, principal components and image analysis. They concluded that, although all were effective, common factor analysis was probably the most appropriate method. This is the method used in the present study to refine the various socio-economic indicators as potential predictors of social service demand.

URBAN DOCUMENTATION CENTRE
RESEARCH UNIT FOR [illegible] STUDIES
McMASTER UNIVERSITY
HAMILTON, ONTARIO

One of the purposes of this study was to test the efficacy of individual census indicators as compared to factor-analytic derived aggregate indicators in predicting community service demand.

MODEL CONSTRUCTION

The other major methodological issue relating to the present study was the development of statistical models which relate the socio-economic indicators to community service utilization. At least three major methodologies have been utilized in this regard - multiple regression, path analysis and partial correlation analysis.

Multiple regression is the most commonly employed method, with a long history in both the economic and social fields. It has also been used in predicting mental health (Dear, 1976) and community service utilization (Pennock et al, 1977).

The major strength of multiple regression analysis lies in its ability to utilize a set of independent variables (in the present case, census indicators) to predict a single dependent variable (community service utilization rates).

The major weakness of the method is that it does not provide an analytical basis for making causal arguments about the relationship between the dependent and independent variables. For example, variables A, B, C and D may be identified by multiple regression analysis as a predictor set for variable E. It cannot be assumed from this result that variable A has any causal effect on variable E. Possibly variable A is associated with variable D and its effect on E is only reflective of its relationship with D. In this case, changing A would not necessarily have any effect upon E, if D did not also change.

As a more concrete example, suppose the incidences of single parent families, senior citizens and cheap housing were found to be predictive of the utilization of home nursing services. This does not

necessarily mean that a high incidence of single parents causes a high utilization of home nursing services in an area. It may be that both the single parents and seniors live in the area because of the cheap housing and it is the high incidence of seniors that causes the high utilization of home nursing services. In this case, the relationship identified by multiple regression between single parents and home nursing services is a spurious relationship having no causal basis.

One method for clarifying these relationships is that of path analysis. It is a less used technique which was originally developed in biology and economics and has gained increasing acceptance in social research (Duncan, 1966). This method utilizes the results of multiple regression to test various interpretations of the relationships among the dependent and independent variables (Kerlinger and Pedhazur, 1973). It has been utilized by Anderson (1972) to examine the relationship between various socio-economic and service variables.

A third methodology involves the use of partial correlations to test alternative causal models (Blalock, 1971). This method is very similar to path analysis in its intent and has been used to further test results achieved from that procedure (Eron, Huessmann, Lefkowitz and Walder, 1972).

In the present study, all three methodologies were utilized in order to capitalize on the strengths and compensate for the weaknesses of each.

In summary, the purpose of this study was to develop and test predictive models relating socio-economic indicators to the utilization of various community services. Both individual and aggregate indicators were used to test the relative efficacy of each. The data was subjected to three modes of analysis to develop and interpret the models in causal terms.

CHAPTER II

METHODOLOGY

SETTING

The Regional Municipality of Hamilton-Wentworth is a community of 410,000 people located in Southern Ontario. Economically, the area is marked by a dependency on heavy industry, particularly those related to steel manufacturing and steel product fabricating.

Socially, the area tends to be similar to other Ontario urban areas. It does, however, have higher than average rates of dependency on income maintenance programs and higher crime rates. It was also found to have somewhat higher than average marriage rates and lone parent family rates (Pennock, 1980).

In calculating agency utilization rates, it was necessary to use 1979 population figures. These were available from the annual assessment on the basis of city planning neighbourhoods, which did not have the same boundaries as the 1976 census tracts. As a result, it was necessary to construct "study areas" which combined the boundary systems of both census tracts and planning neighbourhoods. Given this standardization, it was possible to access both the assessment and census data bases for common geographical sub-units.

Using this approach, the municipality was divided into sixty study areas.

SOCIO-ECONOMIC INDICATORS

Census indicators were utilized for three areas of study - housing, the family, and economic/employment characteristics. A description of the indicators is presented in Table I.

TABLE I: DEFINITIONS OF CENSUS INDICATORS

Older Housing:	Number of dwellings built prior to 1945 as a percent of total dwellings, 1971 Census.
New Housing:	Number of dwellings built after 1962 as a percent of total dwellings, 1971 Census.
Length of Occupancy:	Number of dwellings occupied by Census respondents for less than three years, 1971 Census.
Movers:	Number of household heads who had changed dwelling within same census tract during previous five years as a percent of total household heads, 1971 Census.
Migration:	Number of household heads who had moved into the census tract during the previous five years as a percent of total household heads, 1971 Census.
Population Density:	Number of persons per square kilometre, 1976 Census.
Non-family Households:	Number of non-family households as a percent of total households, 1976 Census.
Single Detached Dwellings:	Number of single detached dwellings as a percent of total dwellings, 1971 Census.
Single Attached Dwellings:	Number of single attached dwellings as a percent of total dwellings, 1971 Census.
Apartments:	Number of apartments as a percent of total dwellings, 1971 Census.
Duplex:	Number of duplexes as a percent of total dwellings, 1971 Census.
Lone Parent Families:	Lone parent families as a percent of all families, 1976 Census.
Divorced:	Divorced persons as a percent of total population, 1976 Census.
Widows:	Widowed persons as a percent of total population, 1976 Census.
Seniors:	Number of persons 65 years and over as a percent of total population, 1976 Census.
Family Households:	Number of family households as a percent of total households, 1976 Census.

cont'd....

Table I: Definitions of Census Indicators cont'd

Family Size:	Average number of persons per family, 1976 Census.
Married Female Labour Force Participation:	Married females in the labour force as a percent of total married females, 1976 Census.
Childless Couples:	Number of two parent families with no children as a percent of total families, 1976 Census.
Age Groupings:	Population age group as a percent of total population, 1976 Census - 0-5, 6-14, 15-17, 18-24, 25-34, 35-44, 45-54, 55-64.
Rented Dwellings:	Rented dwellings as a percent of total dwellings, 1976 Census.
Household Size:	Average number of persons per household, 1976 Census.
Dwelling Size:	Average number of rooms per dwelling, 1976 Census.
Housing Value:	Average value of owned dwellings, 1971 Census.
Illiteracy:	Number of persons, 18 years and over, out of school, with less than a Grade 8 education as a percent of total out-of-school population aged 15 years and over, 1976 Census.
Unemployment Male:	Number of males 15 years of age and over, seeking work, as a percentage of total male labour force, 1976 Census.
Unemployment Female:	Number of females 15 years of age and over, seeking work, as a percentage of total female labour force, 1976 Census.
Labour Force Participation Rate - Male:	Number of males 15 years and over in the labour force as a percent of total males 15 years and over, 1976 Census.
Labour Force Participation Rate - Female:	Number of females 15 years and over in the labour force as a percent of total females 15 years and over, 1976 Census.
Income:	Average individual income, 1976, special tabulation (Compusearch, 1980).

In addition to this listing, two specially derived indices were subjected to a preliminary analysis - the family life cycle index and an income disparity index. In the preliminary analysis, however, these indices were not significantly correlated with any of the other indicators and did not yield a significant loading on any factors. For this reason, they were dropped from the main analysis.

AGENCY UTILIZATION RATES

A total of nine agencies were utilized in the analysis. A description of each agency is provided in Table II (see page 12).

In all cases, the agency caseloads were subjected to a geo-coding which utilized the client address to place each client in one of the study areas. When the total number of clients in each study area was identified, an agency utilization rate was calculated based upon the number of clients per 1,000 population.

With the exception of the general welfare agency (Regional Social Services), a 100% sampling of caseloads was carried out. In the case of Regional Social Services, every tenth case was selected.

ANALYSIS

Each set of census indicators was subjected to a factor analysis with orthogonal, varimax rotation using the standard SPSS program. This yielded sets of family, housing and economic factors. Factor scores were then generated for each study area on each of the factors. These factor scores then served as independent variables in the subsequent regression analysis.

The factor scores were subjected to step-wise multiple regressions using the individual agency utilization rates as the dependent variables. In total, then, thirteen regression equations were developed using the factor scores. For each equation, the multiple

correlation coefficient and R^2 statistic were generated as a measure of the potency of the equation. The R^2 statistic can be interpreted to indicate the percentage of the variance in the dependent variable which is accounted for by the equation.

In a second step-wise multiple regression analysis, the individual census indicators, rather than the factor scores were utilized as independent variables. Again, thirteen regression equations were generated, as were the R^2 statistics.

The R^2 values for the two sets of regression equations were then compared to ascertain whether the factor scores or the individual indicators yielded more potent results. The independent variables yielding the highest R^2 values were utilized for the remaining analysis.

For each agency, the most potent independent variables were then subjected to a path analysis. Path coefficients were calculated, based upon the beta weights from the multiple regression equation; using procedures prescribed by Kim and Kohout (1975). For each agency, a path diagram was constructed, path coefficients were developed and an analysis of direct vs indirect effects were undertaken. In this way, thirteen tentative causal models were developed to relate the independent variables to the agency utilization rates.

The tentative models were then subjected to a partial correlation analysis as recommended by Blalock (1971). The path models were utilized to identify a series of hypotheses about the significance and non-significance of the various partial correlations generated by the model. These hypotheses were then checked against the actual partial correlations to test their validity. If the actual results did not agree with the hypotheses, then the hypotheses were not accepted and the validity of the model was questioned.

TABLE II: SERVICE DESCRIPTIONS

Agency	Description	Caseload Utilized	N
Children's Aid Society	Serves children, adolescents and families and families under Child Welfare Act. Foster care, unmarried mothers and counselling to children under 16 years of age and their parents.	Family Counselling 1979	746
Catholic Children's Aid Society	Same as above for Catholic families	Family counselling Jan. to Sept., 1980	559
Family Services of Hamilton Wentworth	Serves families with counselling, credit counselling and home management programs.	Intake 1979	1,591
Chedoke Child and Family Centre	A regional children's centre for children with learning disabilities, behavioral disorders, developmental handicaps and communications disorders. General family support programs.	Intake April to Sept., 1978	416
Meals-on-Wheels	A hot meal delivery service for homebound individuals.	1979	838
Regional Social Services	Administrators of General Welfare Assistance, an emergency income-maintenance program	Active recipients October, 1980 10% sample	530
Regional Police	Police service for the Region	All calls received requiring deployment of uniformed officers to respond to complaints re:	
		Crimes against persons	2,959
		Crimes against property	9,230
		Disturbances	7,798
		Liquor Control Act	1,074
		Others	10,466
		February-June, 1980	

Table II: Service Descriptions cont"d

Agency	Description	Caseload Utilized	N
McQuesten Legal and Community Services	Services provide individuals with advice on legal matters, legal representation and community consultation to neighbourhood groups.	All calls requiring assistance 1979	312
Addiction Research Foundation	An educational and research organization dealing with problems of drug/alcohol dependency.	Requests for information and Referral 1978-1980	170

CHAPTER III

RESULTS: FACTOR ANALYSIS

FAMILY ANALYSIS

The results of the analysis of family indicators are presented in Table III.

Factor I, which accounted for 41.8% of the variance, appeared to reflect a constellation of variables associated with families of school-aged children. Areas scoring high on this factor tended to have a high concentration of school-aged children (aged 6-17) and adults aged 35 to 44. The concentration of children aged 6 and under also had a significant positive loading. These areas would tend to have larger family households and relatively low concentration of families without children. The concentration of senior citizens had a significantly negative loading.

Factor II (23.4% of variance) was clearly a "young families" factor. The concentration of children aged under 6 and adults aged 25-34 had the highest loadings. The age grouping appears to reflect the parent-child ages associated with young families. The concentration of lone parent families also had a significantly positive loading. By contrast, the concentration of widows and older children had significantly negative loadings.

Factor III, which accounted for 20.1% of the variance, appeared to be related to family disruption due to marital breakdown or the death of a spouse. Areas scoring high on this factor would be expected to have a high concentration of divorced persons, widows, lone parent families and senior citizens.

The nature of Factor IV, which accounted for only 7.9% of variance, was less clear. On the one hand, the high positive loadings

for senior citizens suggested an "older family" factor. However, significantly positive loadings for household/family size and lone parent families do not appear to be consistent with this explanation.

Factor V (6.9% of the variance) had significant positive loadings for the concentration of persons between the ages of 25 to 44 and the labour force participation rates of married females. However, the only significant child-related variable was the concentration of children aged 25 and over. The meaning of this factor, therefore, was unclear. The presence or absence of children was not significantly related, so it does not appear to reflect childless couples.

In conclusion, this preliminary analysis yielded three major factors which accounted, in total, for approximately 85% of the variance. Two of these appeared to be related to family life cycle (school-aged families and young families) and the third was a family disruption factor.

Two smaller factors accounted for the remaining 15% of the variance and their meanings were less clear.

TABLE III: FAMILY FACTORS

FACTOR I (41.8%) School Aged Families	
Children aged 6-14	.87
Children aged 15-17	.84
Household size	.77
Average No. of children	.77
Population aged 35-44	.62
Children aged under 6	.45
Senior Citizens	-.37
Families with no children	-.94

FACTOR II (23.4%) Young Families	
Children aged under 6	.83
Population aged 25-34	.81
Lone parent families	.40
Widows	-.28
Children aged 15-17	-.40
Children aged 18-24	-.41

FACTOR III (20.1%) Family Disruption	
Divorced population	.97
Widows	.73
Lone parent families	.40
Senior citizens	.34

FACTOR IV (7.9%) Older Families	
Senior citizens	.79
Household size	.59
Lone parent families	.42
Family size	.43

FACTOR V (6.9%) (Unlabelled)	
Population aged 25-34	.54
Population aged 35-44	.30
Married female participation rate	.29
Lone parent families	-.31
Children aged 25 & over	-.58

HOUSING

The results of this analysis are presented in Table IV.

The first factor, which accounted for 38.8% of the variance, appeared to be reflective of apartment living. The concentration of apartments had the highest positive loading followed by rental tenures, non-family households, mobility, population density and small households.

Factor II (27.5% of the variance) had significant positive loadings for newer housing and housing values. Family dwellings and longer occupancy were also related. This factor was, therefore, labelled "New Family Housing".

Factor III (15.3% of the variance) appeared to be a mobility factor with both "movers" and "migration" yielding high positive loadings and "length of occupancy" yielding a negative loading. Single-attached housing types and rental tenures also had positive loadings.

Factor IV (12.4%) appeared to be related to the concentration of large single-detached family dwellings.

Factor V (5.9%) appeared to reflect the concentration of high density, older duplex developments.

TABLE IV: HOUSING FACTORS

FACTOR I (38.8%) Apartment Living	
Apartments	.86
Rented dwellings	.85
Non-family households	.69
Movers	.29
Population density	.29
Length of occupancy	-.39
Household size	-.47
Number of rooms	-.63

FACTOR II (27.5%) New Family Housing	
New housing	.90
Value	.73
Non-family households	-.47
Length of occupancy	-.55
Old housing	-.78

FACTOR III (15.3%) Mobility/Single-Attached	
Movers	.87
Single attached	.72
Migration	.46
Rented dwellings	.43
New housing	.27
Length of occupancy	-.43

FACTOR IV (12.4%) Single-detached	
Household size	.81
Single-detached	.72
Number of rooms	.47
Non-family households	-.33
Movers	-.35

FACTOR V (5.9%) High Density Duplex	
Duplex	.92
Population density	.72
Old housing	.26
Migration	-.29

ECONOMIC/EMPLOYMENT

The results of this analysis are presented in Table V.

Factor I, which accounted for 61.2% of the variance, appeared to be related to economic dependency insofar as high positive loadings were obtained by the groupings which are typically associated with dependency on income maintenance programs - unemployed persons and senior citizens. This factor was also associated with low rates of male labour force participation and high rates of female illiteracy.

Factor II appeared to be measuring poverty. High scores on this factor would be related to low incomes and high rates of male and female illiteracy.

Three factors accounted for the remaining 14% of the variance and all were related to labour force participation.

The fact that unemployment did not load significantly on the poverty factor is worthy of note. Income appeared to be independent of labour force status. Low income was related to the educational attainment of a person living in an area, regardless of whether they were employed or unemployed.

TABLE V: ECONOMIC FACTORS

FACTOR I (61.2%) Economic Dependency	
Female unemployment	.90
Male unemployment	.89
Senior citizens	.82
Female illiteracy	.78
Male participation rate	-.70

FACTOR II (24.7%) Poverty	
Male illiteracy	.92
Female illiteracy	.54
Income	-.68

FACTOR III (6.6%) Labour Force Participation	
Female participation rate	.57
Male participation rate	.36

FACTOR IV (4.5%) Male Labour Force Participation	
Male participation rate	.42

FACTOR V (3.0%) Married Female Labour Force Participation	
Married female participation rate	.50

SUMMARY

In general terms, the factor analysis procedure generated a number of internally consistent factors. Some, however, were more easily interpreted than others, although the more significant factors (i.e. those which explained a large portion of the variance) tended to be the most amenable to interpretation.

When family indicators were used, approximately 85% of the variance was explained by three factors. Two of these were related to family life cycle, while the third appeared to be associated with family breakdown.

In the case of the selected economic indicators, 86% of the variance was explained by only two factors - economic dependency and poverty. The apparent independence of these two dimensions was noteworthy.

The housing indicators yielded four factors which appeared to be based upon housing types - apartments, single-detached, duplex and single-attached, although the latter was interrelated with mobility indicators. These four factors accounted for approximately 73% of the variance. The remaining 27% was related to a housing age/value factor.

These factors, then, appear to represent the major dimensions underlying the socio-economic data base utilized in the present study. The apparent internal consistency of the factors were judged to justify their further use as independent variables in the multiple regression analysis.

CHAPTER IV

RESULTS: REGRESSION ANALYSIS

Multiple regression was used as a method for study because of its ability to sort out the major predictors from the minor predictors in a set of predictor variables. It accomplishes this by firstly sorting out the significant from the insignificant variables based upon F ratios and, then, in a step-wise procedure, inserting the significant variables into the equation in the order of their predictive potency. Thus, the first variable entered into the equation tends to be the most potent predictor, followed by the second, third, fourth, etc.

The procedure yields a number of summary statistics. Insofar as the present study was concerned with the predictive potency of the various independent variables, extensive use was made of the R^2 statistics which measures the amount of variance explained by the variables included in the regression equation. The extent to which each variable increased or incremented the value of R^2, as it was entered into the equation, was used as a measure of the predictive potency of each independent variable.

The actual regression equations are presented in Appendix I to this report.

COMPARISON OF METHODS

Table VI presents the R^2 values obtained from the two sets of independent variables. The use of individual socio-economic indicators appeared to result in more predictive accuracy than the use of factor scores. The R^2 values, based upon individual indicators, were higher in every case. For this reason, subsequent analyses were limited to this data base.

TABLE VI: R^2 VALUES FOR TWO METHODS

	R^2 Values	
	Factors	Indicators
Meals on Wheels	.56	.85
Police: Persons	.55	.73
Catholic Children's Aid Society	.50	.69
Police: Disturbances	.50	.68
Children's Aid Society	.49	.58
Family Services of Hamilton Wentworth	.30	.57
Police: Property	.37	.52
Police: Liquor Control Act	.31	.44
Addiction Research Foundation	.35	.42
Regional Social Services	.35	.40
Police/other	.25	.38
McQuesten Community Legal Services	.28	.37
Chedoke Child & Family Centre	.12	.15

The increases in R^2 value ranged from a low of .03 (Chedoke Child and Family) to .29 (Meals on Wheels).

When the individual indicators were used, the actual R^2 values ranged from .15 (Chedoke Child and Family) to .85 (Meals on Wheels). Generally speaking then, the results in most cases were impressive enough to justify further analysis.

THE INDIVIDUAL INDICATOR APPROACH

Given the greater potency of the individual indicator data base, each equation was then analyzed in terms of the extent to which each indicator incremented the R^2 value. The greater the increment associated with the indicator, the greater was its potency as a predictor of the particular agency utilization rate.

The incremental values for each of the family indicators are presented in Table VII. Thus, for example, the "seniors" variable increased the predictive accuracy, or R^2 value, of the Meals on Wheels equation by .67 or 67%. The asterisks denote variables which were inserted in the equation but incremented the R^2 values by less than .01 or 1%.

The seniors variable emerged as a major predictor of the demand for Meals on Wheels. No single family indicator, however, emerged as a major factor in demand across the agencies.

The lone parent family rate was included in eight of the equations but in only one case (community legal services) did it have an incremental value in excess of 1%. The concentration of family households was included in seven cases and accounted for more than 1% on only three occasions.

The married female participation rate, the concentration of widows and the population age group 25-34 did not emerge in any of the equations.

TABLE VII: INCREMENTAL R^2 VALUES FOR FAMILY INDICATORS

	Lone Parent Families	Divorce	Widows	Seniors	Family Households	Family Size	Married Female Part. Rate	Population Aged 0-5	Population Aged 6-14	Population Aged 15-17	Population Aged 18-24	Population Aged 25-34	Population Aged 35-44	Population Aged 45-54	Population Aged 55-64	Childless Families
Meals-on-Wheels				.67		*			.01						.01	.01
Children's Aid Society	*	*				.01		.03	.08	*				*		
Catholic Children's Aid Society		.04							.03					.01		
Family Services	*	.01			*											
Chedoke Child & Family																
Reg. Social Services	*				*					*	.01		*	*		
Addiction Research Fdn				*	.03						.01			*		
McQuesten Legal Services	.05															
Crimes/Persons	*										.02		*	*		
Crimes/Property	*	*			.03											
Crimes/Disturbances	*	.02			*						.01		*	*		
Crimes/LCA		*			*						.01					
Crimes/Other					.01											

The results relating to the housing indicators are presented in Table VIII. The concentration of non-family households was included in eleven of the thirteen regression equations and in six of these cases, it was associated with an increment of one percent or more. It was a particularly potent variable in the cases of Regional Social Services and liquor-related police calls, where it accounted for increments of 28% and 20% respectively.

Rented dwellings emerged in nine of the equations and in only three of these cases was the incremental value less than one percent.

Housing age, single attached dwellings, apartments and movers appeared to be significant predictors of police services but were less related to other services.

Conversely, housing value tended to show a strong relationship with the four family and child services.

Migration, population density and the concentration of duplex dwelling did not appear to be significant predictors for any of these agencies.

In summary, then, rented dwellings and non family households showed some consistency across the agencies. Other variables were related to particular clusters of agencies.

The results pertaining to the economic/employment indicators are presented in Table IX. The illiteracy variable emerged from the analysis as a major predictor of utilization. It was included in the equation of all but one of the agencies and in only one of those cases did it increment the predictive power by less than one percent. It was particularly potent in terms of the police rates (with the exception of the Liquor Control Act) and the two child welfare agencies.

TABLE VIII: INCREMENTAL R^2 VALUES FOR HOUSING INDICATORS

	Rented dwellings	Household size	Dwelling size	Housing value	Older housing	New housing	Length of occupancy	Movers	Migration	Population density	Non family households	Single detached	Single attached	Apartments	Duplex
Meals-on-Wheels		*	.05								*		*	.01	
Children's Aid Society				.05	*	*					.06				
Catholic Children's Aid	.01			.05				.06				.02			
Family Services	*	.01	.24	.04	*		.13				*	*		.02	
Chedoke Child & Family				.08								.08			
Reg. Social Service	*	.01	*	.05		*					.28			*	
Addiction Research Fdn.	.02	.01									.02				
McQuesten Legal Service	.01	.02						.04			*				
Crimes/Persons	.14			*	.01			.02			.06		.02	.02	
Crimes/Property	.07			*	.01			.02			*		.03	.01	
Crimes/Disturbances			*	*	*			.02			.03		.06	.10	
Crime/LCA	.01				*			.03			.20		.12	.03	
Crimes/other	*				*						*		.04	.04	

The income variable was included in all but two of the equations, but in only three cases was it associated with an increment of one percent or more.

Female labour force participation was included in all but one of the police equations as well as the legal services clinic.

Male unemployment was included in only one equation (Addiction Research Foundation) and the remaining three variables did not appear to be significant predicators for any of the agencies.

In summary, among the employment/economic variables, then, illiteracy and, to a lesser extent, income appeared to be the most important predictors of agency utilization rates.

TABLE IX: INCREMENTAL R^2 VALUES FOR ECONOMIC/EMPLOYMENT INDICATORS

	Illiteracy	Unemployment - Male	Unemployment - Female	Labour Force Part.-Male	Labour Force Part.-Female	Married Labour Force Part.-Female	Income
Meals-on-Wheels							*
Children's Aid Society	.37						*
Catholic Children's Aid	.44						*
Family Services	.10						*
Chedoke Child & Family	*						
Regional Social Services	.01						*
Addiction Research Fdn.	.04	.01					*
McQuesten Legal Service	.03				*		.19
Crimes/Persons	.37				*		.01
Crimes/Property	.29				.01		*
Crimes/Disturbances	.36				*		.36
Crimes/Liquor Control Act	.02						*
Crimes/Other	.27				.01		

SUMMARY

The regression procedures appeared to be successful in "sorting out" the independent variables according to their predictive potency. Some variables, such as illiteracy, appeared to show a significant pattern across the agencies. Others, such as housing value, were related to some types of services, but not to others. A few variables were found to be unrelated to the utilization of agencies included in this study, i.e. married female labour force participation rate.

The next step in the analysis involved the utilization of each of the significant predictors, as identified by the regression analysis, in a path analysis to examine the causal nature of the relationship between the independent and dependent variables.

CHAPTER V

RESULTS: CAUSAL ANALYSIS

At this point in the analysis, six of the agency utilization rates were dropped from consideration as a result of low R^2 values. Only those utilization rates with R^2 values of .50 or above were subjected to path analysis.

As a result of the apparent superiority of the individual indicators, it was this set of independent variables which were subjected to the analysis. In summary, then, the use of path and partial correlation analysis was confined to seven utilization rates as dependent variables and the individual indicators as independent variables.

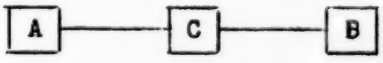
The previous regression analysis, identified which independent variables appeared to have the greatest predictive accuracy vis-a-vis the utilization rates. Each of the independent variables, then, was found to have a significant relationship with the appropriate utilization rate. Stated somewhat differently, this suggests that each of the independent variables had a significant amount of co-variance with the utilization rate.

This co-variance, however, can be of two major types - causal or non-causal. If the co-variance is found to be largely non-causal, then the relationship is said to be "spurious". The first step in the path analysis, then, decomposed the co-variance between each independent and dependent variable into its causal and non-causal components. The basic indicator of co-variance was the pearson-product moment correlation.

In carrying out this de-composition, path coefficients were derived which can be used to indicate the extent to which the causal co-variance was "direct" as opposed to "indirect". Thus, for example, the correlation between variable A and variable B may be significant

and causal. However, the causal effect of A upon B may occur indirectly through a third variable C, in which case the path coefficient between A and B would be insignificant, despite the significant causal correlation.

The path coefficients were then utilized to construct graphically alternative causal models, which were then tested against hypothesized partial correlations. To return to the above example, the insignificant path coefficient suggests that the correlation between A and B would be insignificant if the effects of C were partialled out. Further, the correlation between B and C should be significant if the effects of A are partialled out. Graphically, this would appear as follows:



$r_{AB.C} = 0$
$r_{CB.A} \neq 0$

If, however, the results demonstrated that AB.C was significantly different from zero while CB.A was not, then the suggested model would be as follows:

Alternatively, if both of the values were significantly different from zero, the model would be as follows:

Using this process of partial correlation analysis, then, it is possible to test alternative models, given more than one independent variable.

CHILD WELFARE SERVICES

The results pertaining to the two child welfare services are presented in Table X. The first column, headed "r", presents the correlation coefficient for the independent variable and utilization rate. The second and third columns show the decomposition of the correlation into the causal and non-causal components.

In both cases, "illiteracy" and "housing value" were identified as the primary causal variables. Similarly, in both cases, the child age variable showed minimal causal effects.

The results from the partial correlation analysis are presented in Tables XI and XII. The numbers inserted into the model are the path coefficients. Listed below the model are the hypothesized partial correlations as well as the actual results. In each case, a large number of alternative models were tested but only those for which all hypotheses were confirmed are presented in this report.

In both cases, the apparent primacy of the illiteracy and housing value variables was supported.

In the case of the Children's Aid Society, the causal effects of the remaining three variables were expressed indirectly through "illiteracy". In the case of the Catholic Children's Aid Society, the remaining variables acted indirectly through both illiteracy and housing value.

TABLE X: DECOMPOSITION OF CHILD WELFARE CO-VARIANCE

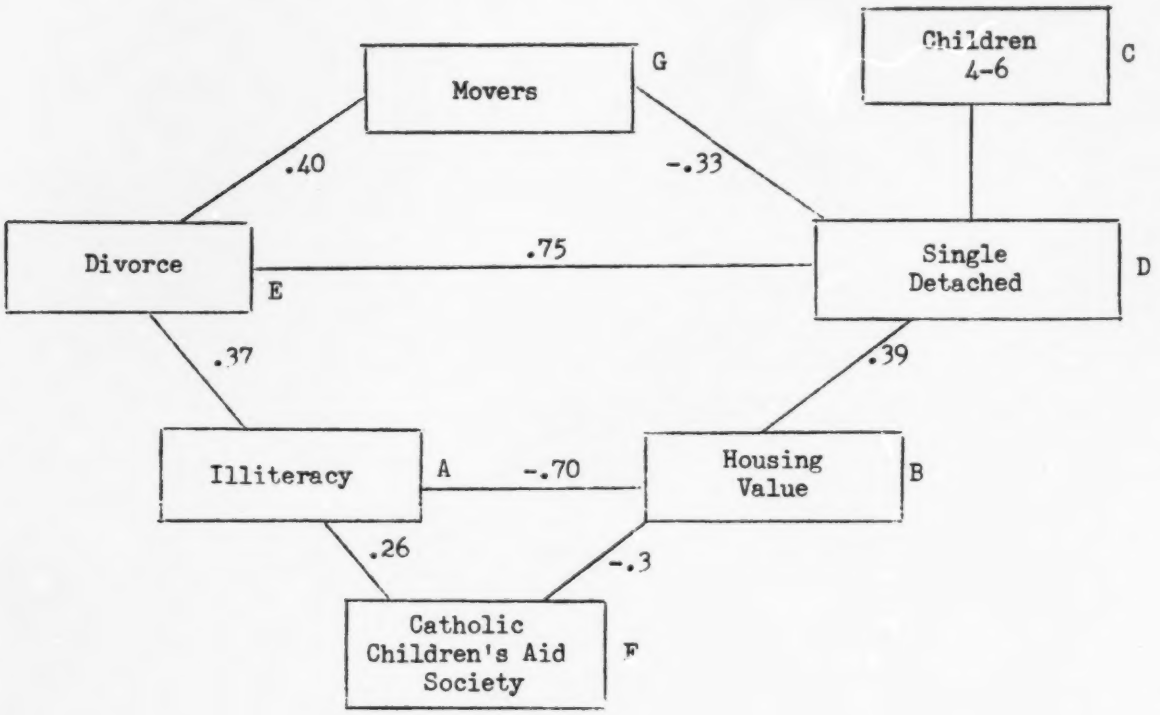
Children's Aid Society

	r	Causal	Non-Causal
Illiteracy	.61	.61	0
Population Aged 6-14	.32	.29	.03
Housing Value	-.59	-.41	-.18
Non-family Households	.30	.24	.06
Children Aged 6-10	.29	.19	.10

Catholic Children's Aid Society

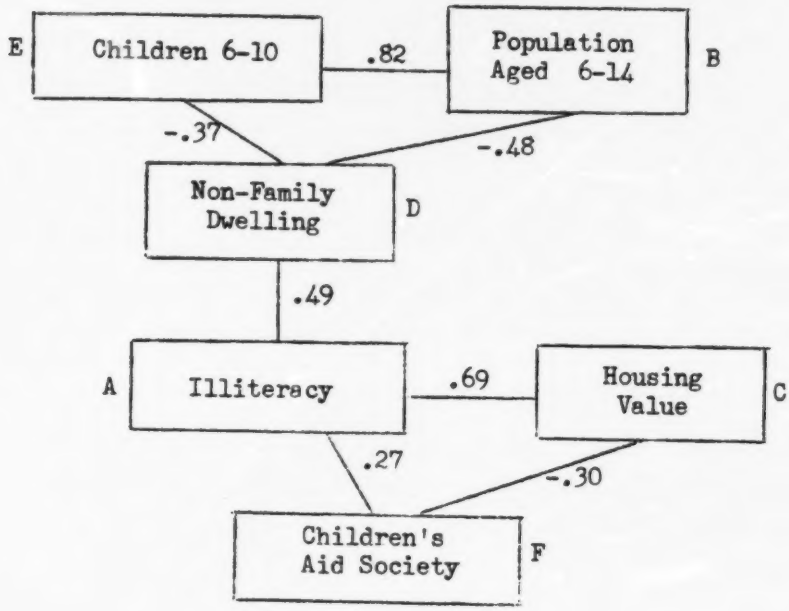
	r	Causal	Non-Causal
Illiteracy	.66	.78	-.12
Housing Value	-.62	-.50	-.12
Movers	.31	.25	.06
Children Aged 4-6	.27	.18	.07
Single Detached Dwelling	-.24	.16	-.40
Divorce	.26	.33	-.07

TABLE XI: CATHOLIC CHILDREN'S AID SOCIETY MODEL



Hypothesized	Actual
AF.B ≠ 0	.41
AF.C ≠ 0	.65
AF.D ≠ 0	.66
AF.E ≠ 0	.63
AF.G ≠ 0	.64
BF.A ≠ 0	-.30
BF.C ≠ 0	-.63
BF.D ≠ 0	-.60
BF.E ≠ 0	-.62
BF.G ≠ 0	-.61
EF.A = 0	.01
DF.B = 0	-.14
GF.B = 0	.16
GF.A = 0	.11
GA.E = 0	.06
GB.D = 0	.07
GC.D = 0	.12
CF.D = 0	.16
CF.B = 0	.12
CE.D = 0	.01
CE.G = 0	.03
ED.B ≠ 0	.42
ED.A ≠ 0	.47
AB.F ≠ 0	.53

TABLE XII: CHILDREN'S AID SOCIETY MODEL



Hypothesized	Actual
CF.A ≠ 0	-.29
AF.D ≠ 0	.55
DF.C = 0	.12
OF.A = 0	-.01
AC.F ≠ 0	.53
AC.D ≠ 0	-.65
CF.D ≠ 0	.23
AF.D ≠ 0	.55
AF.C ≠ 0	.36
DF.A = 0	-.01
AB.D = 0	.01
EA.D = 0	.06
BC.D = 0	.03
BC.E = 0	.04
EC.D = 0	-.11
AF.B ≠ 0	.58
AF.E ≠ 0	.52
CF.B ≠ 0	.50
CF.E ≠ 0	.43
AC.D ≠ 0	-.65
CD.A = 0	-.18

URBAN DOCUMENTATION CENTRE
RESEARCH UNIT FOR URBAN STUDIES
McMASTER UNIVERSITY
HAMILTON, ONTARIO

MEALS-ON-WHEELS

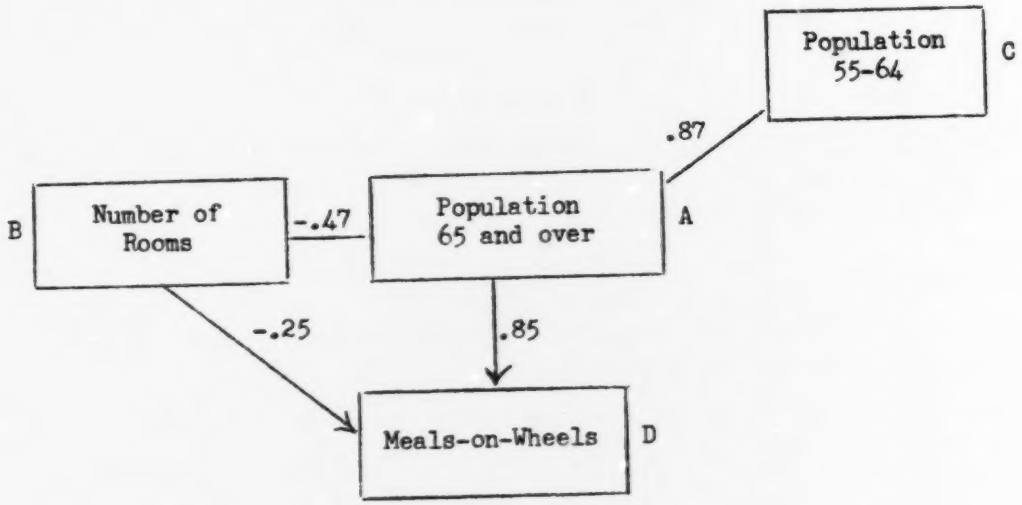
The results pertaining to the Meals-on-Wheels service are presented in Table XIII. The major causal variable was the size of the population aged 65 and over and this outcome was supported by the partial correlation analysis.

There was some confusion, however, concerning the dwelling size variable. The path analysis suggested that the relationship with utilization was largely spurious and this was contradicted by the partial correlation analysis.

The path analysis suggested that the relationship with the population age group 54-65 was largely spurious and this was supported by the partial correlations.

TABLE XIII: MEALS-ON-WHEELS

	r	Causal	Non-causal
Population Aged 65 and over	.82	.82	0
Population Aged 54-65	-.58	-.26	-.32
Dwelling Size	.65	.17	.48



Hypothesized	Actual
AD.B ≠ 0	.77
AD.C ≠ 0	.67
BD.A ≠ 0	.39
BD.C ≠ 0	.56
CD.A = 0	.15
BC.A = 0	.17

POLICE CALLS

The results of the decomposition of co-variance for police calls are presented in Table XIV. In all three cases, "illiteracy" arose as the major causal variable.

In the crimes against property category, the causal effects of the single-attached variable appeared to be minimal. This was also true to a lesser extent in the crimes against persons and disturbances categories.

Rental dwellings emerged as an important causal variable in crimes against property but this was not replicated in the other two cases.

Family/non-family households appeared to be an important causal variable in all three cases.

The relationship between divorce rates and "disturbances" appeared to be largely spurious.

The models which emerged from the partial correlation analyses are presented in Tables XV, XVI and XVII. In all three cases, the primary causal roles of illiteracy and family/non-family households were confirmed.

In the cases of property crimes and disturbances, the effects of the remaining variables appeared to be expressed through the household variable. This was also true of the crimes against persons category with the exception of the population age variable which appeared to span both illiteracy and non-family households.

TABLE XIV: DECOMPOSITION OF POLICE CALLS

Police Calls: Crimes Against Property

	r	Causal	Non-Causal
Illiteracy	.54	.56	-.02
Rental Dwellings	.34	.32	.02
Single Attached	.33	.17	.16
Family Households	-.36	-.32	-.04
Movers	.25	-.23	.48
Apartment	.31	.24	.10

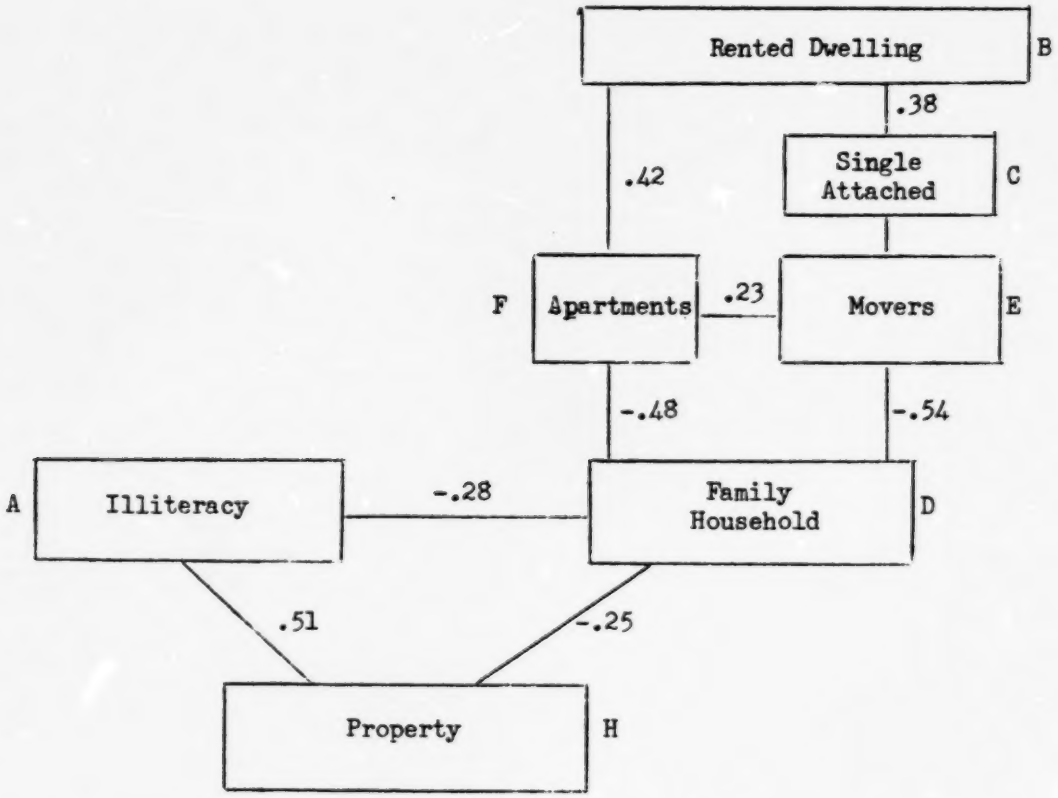
Police Calls: Crimes Against Persons

	r	Causal	Non-Causal
Illiteracy	.60	.46	.14
Rentals	.45	.14	.31
Non-family Households	.59	.39	.20
Single Attached	.36	.22	.14
Movers	.35	.31	.04
Apartments	.41	.30	.11
Population Aged 20-24	.28	.27	.01

Police Calls: Disturbances

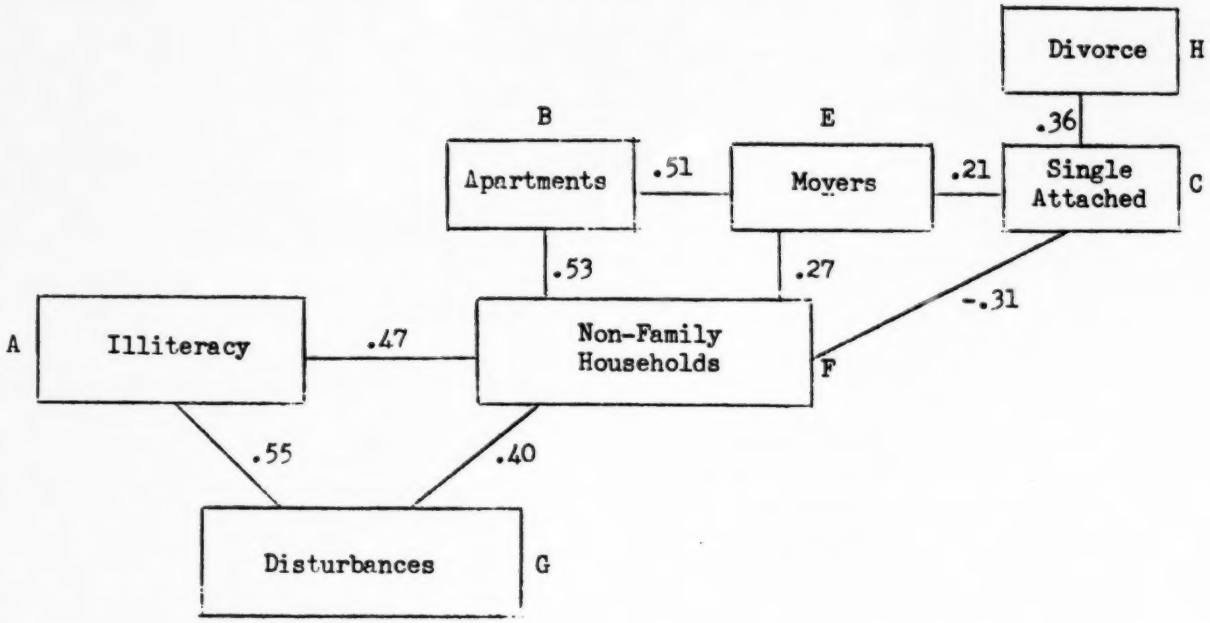
	r	Causal	Non-Causal
Illiteracy	.60	.55	.05
Apartments	.38	.35	.03
Single Attached	.34	.27	.07
Movers	.32	-.23	.55
Non-Family Households	.55	.35	.20
Divorce	.33	-.15	.48

TABLE XV: POLICE CALLS, CRIMES AGAINST PROPERTY



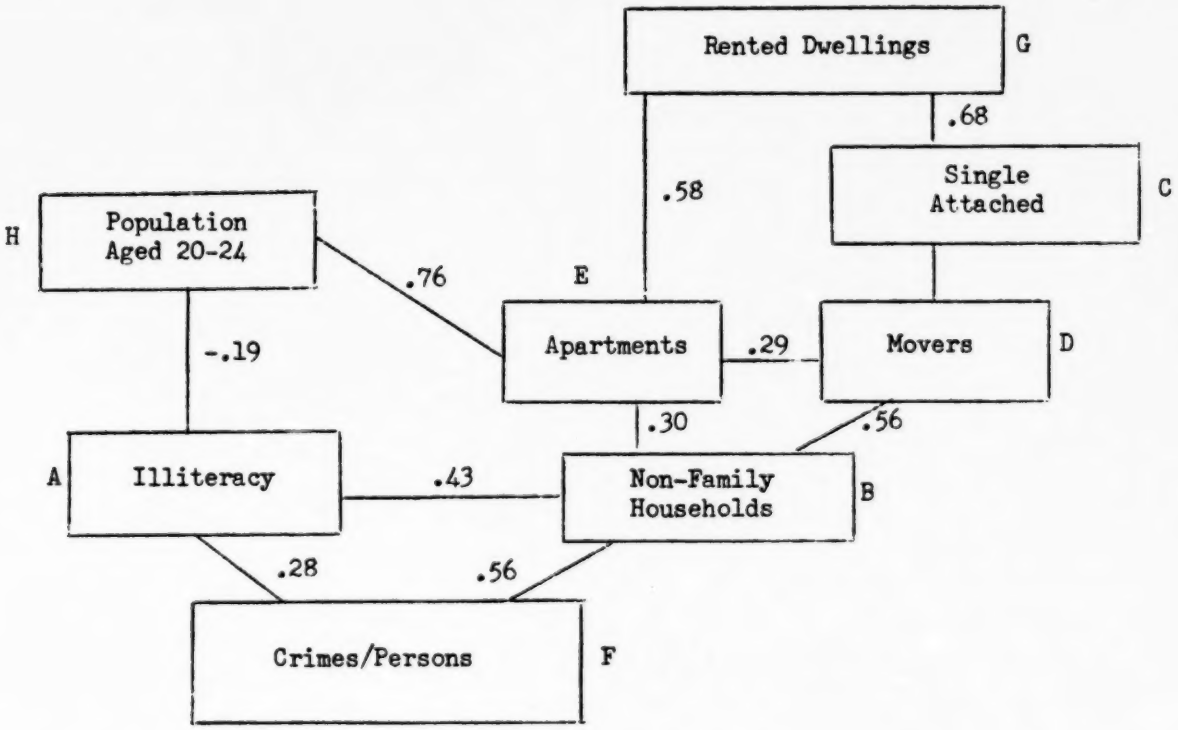
Hypothesized	Actual	Hypothesized	Actual
AH.B ≠ 0	.53	EH.D = 0	.13
AH.C ≠ 0	.53	CH.E = 0	.17
AH.D ≠ 0	.48	BH.D = 0	.16
AH.E ≠ 0	.52	AD.H ≠ 0	.26
AH.F ≠ 0	.54	FA.D = 0	.02
DH.A ≠ 0	.66	EA.D = 0	.04
DH.B ≠ 0	.77	CD.E = 0	.12
DH.C ≠ 0	.34	BD.CE ≠ 0	.17
DH.E ≠ 0	.52	EF.D ≠ 0	.36
DH.F ≠ 0	.67	CF.E = 0	.02
FH.D = 0	.15	BF.CE ≠ 0	.45
		AB.F = 0	.01

TABLE XVI: POLICE CALLS, DISTURBANCES



Hypothesized	Actual	Hypothesized	Actual
AG.B ≠ 0	.61	EG.F = 0	.12
AG.C ≠ 0	.43	CG.F = 0	.17
AG.E ≠ 0	.60	HG.C = 0	.09
AG.F ≠ 0	.44	AF.G ≠ 0	.42
AG.H ≠ 0	.56	BA.F = 0	.06
FG.A ≠ 0	.75	BE.F ≠ 0	.37
FG.B ≠ 0	.42	EF.B ≠ 0	.32
FG.C ≠ 0	.61	CF.E ≠ 0	.26
FG.E ≠ 0	.49	CB.E = 0	.01
FG.H ≠ 0	.53	HF.C = 0	.09
BG.F = 0	-.02	HE.C = 0	.13

TABLE XVII: POLICE CALLS, CRIMES AGAINST PERSONS



Hypothesized	Actual	Hypothesized	Actual
AF.B ≠ 0	.84	EF.B = 0	.01
AF.C ≠ 0	.61	DF.B = 0	.15
AF.D ≠ 0	.61	CF.D = 0	.17
AF.E ≠ 0	.63	CB.D = 0	.19
AF.G ≠ 0	.64	GF.E = 0	.11
BF.A ≠ 0	.41	GF.C = 0	.17
BF.C ≠ 0	.66	GD.C = 0	.09
BF.D ≠ 0	.52	GH.E = 0	.19
BF.E ≠ 0	.46	HB.E = 0	.17
BF.G ≠ 0	.51	DE.B ≠ 0	.27
HF.A = 0	.17		

FAMILY SERVICES

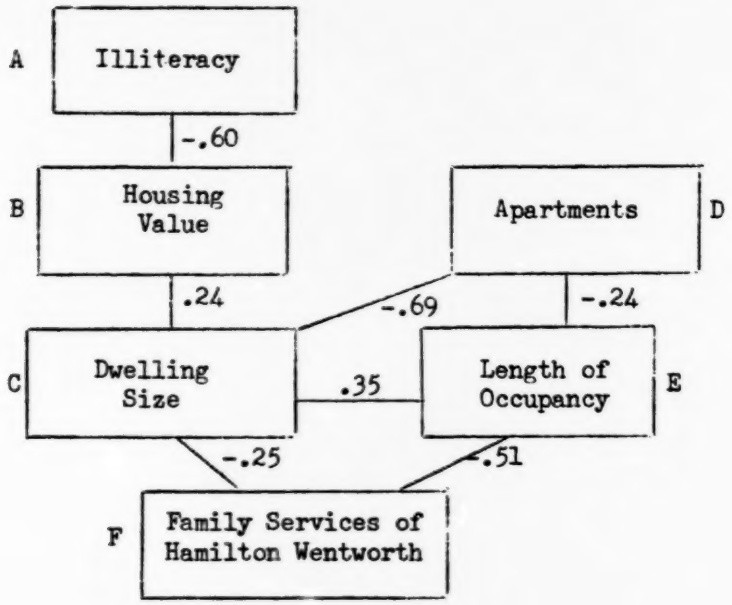
The results pertaining to family services are presented in Table XVIII. This was the only case in which illiteracy did not appear to have significant causal effects.

Three housing variables, dwelling size, length of occupancy and housing value, appeared to have significant causal effects while "apartments" did not.

The partial correlation analysis identified only two of the housing variables (size and length of occupancy) as primary causal factors. The causal effects of housing value appeared to be expressed indirectly through dwelling size.

TABLE XVIII: FAMILY SERVICES

	r	Causal	Non-Causal
Dwelling Size	-.48	-.33	-.15
Illiteracy	.40	.10	.30
Length of Occupancy	-.41	-.60	.19
Housing Value	-.34	-.24	-.10
Apartments	.39	.05	.29



Hypothesized	Actual	Hypothesized	Actual
CF.A ≠ 0	-.46	DF.E = 0	.16
CF.B ≠ 0	-.44	AC.B = 0	-.03
CF.D ≠ 0	-.32	CE.F ≠ 0	.26
CF.E ≠ 0	-.41	DE.C ≠ 0	.39
EF.A ≠ 0	-.52	DC.E ≠ 0	-.58
EF.B ≠ 0	-.62	BD.C = 0	.03
EF.C ≠ 0	-.31	AD.C = 0	.03
EF.D ≠ 0	-.27	BE.C = 0	.17
AF.C = 0	.19	AE.B = 0	-.5
BF.C = 0	-.15		

CONCLUSION

The combined utilization of path and partial correlation analysis appeared to be useful in clarifying the causal relationships among the independent variables.

Illiteracy emerged as a primary causal variable for the child welfare and police services. In the former case, the other causal variable was housing value. In the latter case, the accompanying variable was family/non-family housing.

Family services did not match this pattern. The effects of both illiteracy and housing value appeared to be expressed through the "dwelling size" variable. In this case, "dwelling size" was accompanied by "length of occupancy" as the primary causal factors.

Dwelling size also emerged as a primary factor in the case of meals-on-wheels. The major causal factor, however, was the age distribution of the population.

CHAPTER VI

DISCUSSION

The apparent ability of census indicators to predict service utilization varied with the service being studied. In the cases of the child welfare agencies, the major categories of police calls, the family service agency and meals-on-wheels, the census indicators appeared to be fairly potent predictors. In the remaining cases, the potency identified by the regression analysis was more limited.

The ability of the indicators was enhanced when they were utilized individually rather than in factor-analytically derived clusters. It is possible that the aggregated factors were weakened by containing both important and unimportant predictor variables for individual agencies. This would tend to diminish, overall, the predictive potency of the factors. In contrast, when individual indicators are utilized, the unimportant variables are discarded by the regression procedures.

Family indicators did not emerge as major predictors in this study, other than the family/non-family households variable and some of the age groupings. Indicators of family disruption (lone parent families, divorce and widows) were almost completely insignificant with the exception of "divorce" arising as a significant component of the regression equation for Catholic Children's Aid Society and police disturbances. In the subsequent causal analysis, it was found to impact indirectly on utilization rates through the other, more important variables.

Age characteristics appeared to be a primary causal factor in only one case - Meals-on-Wheels. Age characteristics arose as more remote causal factors in the cases of the two child welfare services and police calls relating to disturbances.

The housing and household indicators, as a set, appeared to play the greatest predictive role in the multiple regression analysis. Generally speaking, the influence of this set of indicators appeared to exceed both the family and economic indicators. In the causal analysis, housing value arose as a primary predictor of both child welfare services. The family/non-family households variables emerged as major predictors of police utilization and dwelling size appeared to be a primary causal indicator for both Meals-on-Wheels and Family Services. In the latter instance, "length of occupancy" also arose as a primary causal variable.

The housing-type variables (single detached, single attached and apartments), which were significant factors in the regression analysis, appeared to influence utilization indirectly through one or more of the variables identified in the previous paragraph. Thus, for example, apartments tended to be related to the crime variables through the intervening "family/non-family household" dimension. This can be interpreted to mean that the concentration of apartments in an area are related to the demand for police services because apartments tend to contain non-family households.

Among the various economic/employment indicators, illiteracy arose as the primary causal factor in the cases of the child welfare and police services. It was more remote in the family service analysis and was not a significant factor in the case of Meals-on-Wheels.

Meals-on-Wheels

This service appeared to be the most amenable to prediction by census variables of all the services included in this analysis. This may be due to the fact that one variable, the size of the "seniors" population, arose as the single most important predictor although "dwelling size" did have some effect. Almost sixty-four percent of causal variance appeared due to the size of the seniors population in an area.

Police Services

Police calls relating to crimes against property, person and disturbances appeared to be related to the census indicators included in this study. The predictive potency of these indicators, however, was more limited when applied to calls related to the Liquor Control Act and the "other" category.

In the cases of the persons, property and disturbances categories, two indicators appeared to be of primary importance - illiteracy and family/non-family households. In general terms, the higher the concentration of adults with less than a grade eight education and non-family households, the greater is the utilization of police services in an area.

The other causal variables, such as structural type (i.e. apartments) and tenure (rental) appeared to effect utilization through one of the two variables identified above.

Child Welfare Services

Both of the children's aid societies included in this analysis yielded similar results. In both cases, the census indicators appeared to be fairly potent predictors of utilization. Illiteracy and housing value were identified as the primary causal variables.

The concentration of children in an area was identified by the regression analysis as a major predictive dimension although the causal analysis suggested that this dimension was important only when it was accompanied by either a high level of illiteracy or low housing values. Apparently, therefore, the size of the child population alone is not an adequate predictor of the demand for child welfare services.

Family breakdown, as measured by the size of the divorced population in an area, was identified as a predictor for only the Catholic agency. The causal analysis suggested that it depended on the illiteracy variable for much of its effect. The concentration of lone-parent families, as a second indicator of family breakdown, was not a significant factor in either case.

Family Service Agency

The model for this service showed interesting deviations from the models for the child welfare agencies. Although both illiteracy and housing value were identified as predictors, their effects were not of the same primary causal nature. In this case, they appeared to effect utilization more indirectly through "dwelling size".

The latter variable, accompanied by "length of occupancy", arose as the primary causal dimension. This was the only case in which "length of occupancy" was identified as having important causal effects.

The various indicators of family breakdown were not identified important predictors.

This may simply reflect the more heterogeneous nature of the family service agency caseload insofar as they deal with more of a cross-section of the population than do the child welfare agencies.

Chedoke Child and Family Services

The second family service facility did not appear to be related to any of the census indicators in a substantial way. The regression analysis could only account for fifteen percent of the variance in CCFS utilization rates as opposed to fifty-seven percent for the family service agency.

It is possible that "distance" may be a more critical intervening variable in the case of the Chedoke agency. Whereas the FSA is located in the downtown area of the city and is, therefore, easily accessible by public transportation, the Chedoke facility is located in the south-west area, well away from the downtown. Further study is obviously necessary to clarify this situation.

Regional Social Services

Only forty percent of the variance in the utilization rates of the general welfare assistance component of the Regional Social Services caseload was explained by the regression analysis.

It is doubtful that, in this case, distance would serve as a confounding factor insofar as workers complete service applications in the client's home and, consequently, client travel to the agency is not an important dimension.

It is not possible at this point, therefore, to adequately explain why the census indicators were of only limited importance in accounting for the utilization of this service. Further study is clearly warranted into this question.

McQuesten Community Legal Services

As with Regional Social Services, the census indicators were of limited success in accounting for the utilization rates of this agency. The regression analysis accounted for only thirty-seven percent of the variance in utilization rates.

As with the Chedoke agency, distance may have been a critical intervening variable. The Legal Services Centre is located outside of the downtown area in the east end of the city and an inspection of utilization rates by study area suggests that most of its caseload resides within that area.

Addiction Research Foundation

Only forty-two percent of the variance in utilization rates for this agency was explained by the regression analysis. This limited potency may be attributable to the nature of the service provided - information and referral.

The caseload, consequently, would include not only persons with alcohol or drug problems but also any resident wanting general information about the problems (i.e. students).

It would, therefore, be expected that this agency would have a fairly heterogeneous "caseload" which might transcend basic socio-economic or age-related dimensions. Census indicators, in such a case, would be of limited utility in accounting for utilization.

* * * * * * * *

Location

All of the agencies for which fifty percent or more of the variance in utilization could be explained by census indicators were located in the general centre of the study area. Theoretically, then, there was some equivalence of accessibility from all areas of the region. Both of the agencies which were located elsewhere (McQuestan and Chedoke) were less amenable to prediction based on census indicators. It is possible that in both of these cases, distance played a critical intervening role.

Caseload Heterogeneity

The information and referral service included in this study (the Addiction Research Foundation) had less than fifty percent of utilization variance explained by the census indicators. It is possible

that the nature of the service offered by this agency results in a more heterogeneous caseload which transcends basic socio-economic characteristics. This would tend to diminish the potency of socio-economic indicators in accounting for varying utilization rates.

Alcohol/Drug Services

An alternative explanation for the limited success in predicting ARF caseloads may be related to the drug/alcohol sector. This tentative conclusion is based on the limited success in predicting police calls related to the Liquor Control Act.

This is an area which appears to require further study.

* * * * * * *

REFERENCES

Anderson, J.G. "Causal Model of a Health Services System", Health Services Research, Spring 1972, 23-42.

Blalock, H.M. Causal Methods in the Social Sciences, Chicago: Aldine Atherton, 1971.

Bloom, B.L. "A census tract analysis of socially deviant behaviours", Multivariate Behavioral Research, 1, 1966, 307-320.

Bloom, B.L. "An ecological analysis of psychiatric hospitalizations", Multivariate Behavioral Research, 1968, 423-463.

Bodian, C.; Gardner, E.A.; Willis, E.M.; Bahn, A.K. Socio-economic indicators from census tract data related to rates of mental illness, U.S. Department of Commerce, Bureau of the Census, 1963.

Browne, F. Principles of Educational and Psychological Testing, Ill: The Dryden Press, Inc., 1970.

Cattel, R. and Adelson, M. "The dimensions of social change in the USA as defined by P-technique", Social Forces, 30, 1951, 190-201.

Coughlin, R.E.; Bieri, K.; Plant, T. The Location of Social Service Facilities in the City of Philadelphia, Regional Studies Research Institute, December, 1976.

Dear, M. Geographical Dimensions of the Demand for Health Care, Department of Geography, McMaster University, Hamilton, 1976.

Duncan, O.D. "Path Analysis: Sociological Examples", American Journal of Sociology, 72, 1-16, 1966.

Eron, L.D.; Huesman, L.R.; Lefkowitz, M.M.; Walder, L.O. "Does television violence cause aggression?", American Psychologist, April, 1972, 253-263.

Fox, K.A. Social Indicators and Social Theory, N.Y.: John Wiley and Sons, 1974.

Francis, W. "What social indicators don't indicate", Evaluation, 1:2, 1973.

Gruenberg, E.M. "Community conditions and psychoses of the elderly", American Journal of Psychiatry, 110, 29-43, 1954.

Jackson, D.J.; Borgatta, E.F.; Goldsmith, H.F. "Data analysis in factorial ecology" in Borgatta, E.F.; Jackson, D.J., eds., Aggregate Data, Beverly Hills: Sage Publications, 1980.

cont'd...

References cont'd...

Kerlinger, F.N. and Pedhazur, E.J. Multiple Regression in Behavioral Research, N.Y.: Holt, Rinehart & Winston, 1973.

Maslove, A. "Urban Social Indicators", Economic Council of Canada, Discussion Paper #35, Ottawa, 1975.

Pennock, M. A multi-factorial analysis of Ontario counties, Addiction Research Foundation, 1975.

Pennock, M.; Steckenreiter, P.; Belton, P. and Hartley, L. A Geographical Analysis of Community Service Utilization in the City of Hamilton, Hamilton: Social Planning and Research Council of Hamilton & District, 1978.

Pollack, E.S. "The application of census socio-economic and familial data to the study of morbidity from mental disorders", American Journal of Public Health, 58, 83-89, 1968.

Redick, R.W. and Goldsmith, H.F. "1970 census data used to indicate areas with different potentials for mental health and related problems", NIMH: Methodology Reports, Series C., No. 3, 1972.

Rosen, B.M. "A model for estimating mental health needs using 1970 census socio-economic data", NIMH: Statistics, Series C, No. 9, 1974.

Spautz, M. The Socio-Economic Gap, Social Sciences Research, June, 1972.

Statistics Canada. Perspectives Canada, Ottawa, 1977.

Trute, B. and Segal, S.P. "Census tract predictors and the social integration of sheltered care residents", Social Psychiatry, 11, 153-161, 1976.